

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application : **10/530,379**
Applicant(s) : **ZHOU et al.**
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Examiner : **CHOWDHURY, Afroza Y.**
Atty. Docket : **NL-021000**

Title: **ELECTROPHORETIC DISPLAY PANEL**

Mail Stop: **APPEAL BRIEF - PATENTS**
Commissioner for Patents
Alexandria, VA 22313-1450

APPEAL UNDER 37 CFR 41.37

Sir:

This is an appeal from the decision of the Examiner dated 5 October 2007, finally rejecting claims 1-19 of the subject application.

This paper includes (each beginning on a separate sheet):

- 1. Appeal Brief;**
- 2. Claims Appendix;**
- 3. Evidence Appendix; and**
- 4. Related Proceedings Appendix.**

APPEAL BRIEF

I. REAL PARTY IN INTEREST

The above-identified application is assigned, in its entirety, to **Koninklijke Philips Electronics N. V.**

II. RELATED APPEALS AND INTERFERENCES

Appellant is not aware of any co-pending appeal or interference that will directly affect, or be directly affected by, or have any bearing on, the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-19 are pending in the application.

Claims 13-19 stand rejected by the Examiner under 35 U.S.C. 112, first paragraph

Claims 7 and 14 stand rejected by the Examiner under 35 U.S.C. 112, second paragraph.

Claims 1-19 stand rejected by the Examiner under 35 U.S.C. 102(e).

These rejected claims are the subject of this appeal.

IV. STATUS OF AMENDMENTS

No amendments were filed subsequent to the final rejection in the Office Action dated 5 October 2007. A reply to the final rejection was filed on 19 December 2007.

V. SUMMARY OF CLAIMED SUBJECT MATTER

This invention relates to an electrophoretic display panel, and a method of driving such a panel. An example electrophoretic medium comprises charged black particles in a white fluid (Applicants' page 4, lines 4-5). If the black particles are at the viewing surface of the panel, the display appears black; if the black particles are at the opposite surface of the panel, the display appears white; if the black particles are suspended between the surfaces, the display appears gray, the gray level being dependent upon the particular location of the black particles relative to the viewing surface (page 4, lines 4-9). The location of the black particles in each pixel is controlled by applying a potential difference to plates on the surfaces of the electrophoretic panel; once positioned to the desired location, the potential difference is removed, and the particle remains at the location for a duration that is dependent upon the viscosity of the liquid. The amount of potential that needs to be applied to each pixel to drive the particles to a new location will be dependent upon the prior location of the particles (page 1, lines 8-10). To eliminate dependencies on history and viscosity, the panel is driven to a known state between picture frames. In a conventional electrophoretic display panel, the panel is driven to an all-white or all-black condition between each picture frame (page 1, lines 10-15). This inter-picture all-white or all-black state, however, often causes disturbing visual effects (page 1, lines 15-17). In accordance with an aspect of this invention, each pixel in the display panel is individually controlled to a desired state between pictures to reduce the effects caused by all-white or all-black inter-picture frames (page 2, lines 6-9). Preferably, each pixel is driven to an inter-picture state that is based on the intended state of the pixel in the next picture. If, for example (FIGs. 3 and 4), the next state of a pixel is dark gray (DG), the pixel is driven to an all-black state (SB); if the next state of another pixel is light gray (LG), that pixel is driven to an all-white state (SW) (page 2, lines 22-27; FIG). By controlling each pixel to provide an inter-picture that is optically close to the next picture, the disturbing visual effects caused by the inter-picture are substantially reduced (page 2, lines 3-6).

As claimed in independent claim 1, the invention comprises an electrophoretic display panel (1 in FIG. 1) for displaying a picture and a subsequent picture comprising:

- a first and a second opposed substrate (8, 9; page 3, lines 28-29);
 - an electrophoretic medium between the substrates (5; page 3, lines 29-30);
 - a plurality of pixels (2; page 3, lines 25-26);
 - a first and a second electrode associated with each pixel for receiving a potential difference (3, 4; page 3, lines 30-31); and
 - a driver (100; page 4, lines 9-11);
- the electrophoretic medium being able to provide each pixel with an appearance, being one of a first and a second extreme appearance and intermediate appearances between the first and the second extreme appearance (page 3, line 33 - page 4, line 1), and
- the driver being able to control (FIG. 3) for each pixel the potential difference
- to a picture value (LG) that provides the pixel with a respective picture appearance being one of the appearances in dependence of the picture to be displayed (0-t1) (page 4, lines 9-11), subsequently
 - to an inter-picture value (SB) that provides the pixel with a respective inter-picture appearance (t1-t2) (page 4, lines 11-12), and subsequently
 - to a subsequent picture value (DB) that provides the pixel with a respective subsequent picture appearance being one of the appearances in dependence of the subsequent picture to be displayed (t3-t4) (page 4, lines 12-13),
- wherein
- the driver is able to control (t1-t2) for each pixel an estimate potential difference as the inter-picture value (SB) that provides the pixels with a respective estimate picture appearance as the inter-picture appearance (page 4, lines 13-16).

As claimed in dependent claim 2, the invention comprises the display panel of claim 1, wherein (FIGs. 3-4) the respective estimate picture appearance (t2-t3) is substantially equal to one of the extreme appearances (SB, SW) associated with the subsequent picture appearance (DG, LG) (page 4, lines 18-20).

As claimed in independent claim 6, the invention comprises a method of driving an electrophoretic display panel, comprising:

- receiving first picture values of a first picture and second picture values of a subsequent picture (page 4, lines 9-13),

- determining inter-picture values based on at least the second picture values (page 4, lines 13-18 and 31-34), and

- applying a sequence of potential differences across electrodes of pixels of the electrophoretic display (FIG. 3), the sequence including:

- potential differences corresponding to the first picture values (LG) (page 4, lines 30-31),

- potential differences corresponding to the inter-picture values (SB) (page 4, lines 31-34), and

- potential differences corresponding to the second picture values (DB) (page 5, lines 2-4).

As claimed in independent claim 13, the invention comprises a display device (FIG. 2), comprising:

- a controller (100) that is configured to (FIG. 3) (page 4, lines 9-18):

- receive first picture values (LG) of a first picture and second picture values (DG) of a subsequent picture, and

- determine inter-picture values (SB) based on at least the second picture values (page 4, lines 13-18 and 31-34), and

- a driver (100) that is configured to apply a sequence of potential differences across electrodes of pixels of an electrophoretic display (page 4, lines 9-16), the sequence including (FIG. 3):

potential differences corresponding to the first picture values (LG) (page 4, lines 30-31),

potential differences corresponding to the inter-picture values (SB) (page 4, lines 31-34), and

potential differences corresponding to the second picture values (DG) (page 5, lines 2-4).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 13-19 stand rejected under 35 U.S.C. 112, first paragraph.

Claims 7 and 14 stand rejected under 35 U.S.C. 112, second paragraph.

Claims 1-19 stand rejected under 35 U.S.C. 102(e) over Webber (USPA 2002/0180687).

VII. ARGUMENT

Claims 13-19 stand rejected under 35 U.S.C. 112, first paragraph

Claims 13-19

The Office action asserts that the claimed controller of claim 13 was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The applicants respectfully disagree with this assertion.

Claim 13 recites "a controller that is configured to: receive first picture values of a first picture and second picture values of a subsequent picture, and determine inter-picture values based on at least the second picture values."

At page 4, lines 9-18, of the specification as filed, the applicants teach:

"The drive means 100 are able to control for each pixel 2 the potential difference to have a picture value to provide the pixels 2 with a respective picture appearance, subsequently to have an inter-picture value to provide the pixels 2 with a respective inter-picture appearance, and subsequently to have a subsequent picture value to provide the pixels 2 with a respective subsequent picture appearance. Furthermore, the drive means 100 are able to control for each pixel 2 an estimate potential difference as the inter-picture value to provide the pixels 2 with a respective estimate picture appearance as the inter-picture appearance. Preferably, the respective estimate picture appearance is substantially equal to one of the extreme appearances associated with the subsequent picture appearance."

Further, the applicants' example timing diagrams of FIGs. 3-4 clearly indicate how the potential differences can be controlled based on the above cited 'picture appearance' and 'subsequent picture appearance' (see page 4, line 21 - page 5, line 16).

The applicants respectfully maintain that "drive means 100 are able to control for each pixel..." corresponds to teaching a controller; "picture value" corresponds to teaching a first picture value; "subsequent picture value" corresponds to teaching a second picture value; and "inter-picture value to provide the pixels 2 with a respective estimate picture appearance... substantially equal to one of the extreme appearances associated with the subsequent picture appearance" corresponds to teaching inter-picture values based on at least the second picture values. Thus, all of the elements of the claimed "controller that is configured to: receive first picture values of a first picture and second picture values of a subsequent picture, and determine inter-picture values based on at least the second picture values" are disclosed in the specification as originally filed, at page 4, lines 9-18 and page 4, line 21 through page 5, line 16.

Because the applicants' original specification clearly demonstrates that the applicants had possession of the claimed controller of claim 13, the applicants respectfully maintain that the rejection of claims 13-19 under 35 U.S.C. 112, first paragraph, is unfounded, and should be reversed by the Board.

Claims 7 and 14 stand rejected under 35 U.S.C. 112, second paragraph

Claims 7 and 14

The Office action asserts that the claimed element of "the inter-picture values are each substantially equal to one of a set of extreme image values" is not clear, and questions "How it is possible for inter-picture [sic] to have the same value as the extreme image values?" The applicants respectfully disagree with this assertion.

As taught by the applicants:

"The electrophoretic medium 5 is able to provide each pixel 2 with an appearance, being one of a first and a second extreme appearance and intermediate appearances between the first and the second extreme appearance... When the charged particles 6 are positioned near the first electrode 3 due to a potential difference of 15 Volts, the pixel 2 has a first extreme appearance, i.e. white. When the charged particles 6 are positioned near the second electrode 4, due to a potential difference of opposite polarity, i.e. -15 Volts, the pixel 2 has a second extreme appearance, i.e. black... [T]he drive means 100 are able to control for each pixel 2 an estimate potential difference as the inter-picture value to provide the pixels 2 with a respective estimate picture appearance as the inter-picture appearance. Preferably, the respective estimate picture appearance is substantially equal to one of the extreme appearances associated with the subsequent picture appearance." (page 3, line 32 - page 4, line 8)

The applicants respectfully maintain that setting the inter-picture values to one of a set of extreme image values (+15, - 15 volts in the example embodiment) is clear, and that, given the applicants' disclosure, one of ordinary skill in the art will easily comprehend how it is possible for the inter-picture values to be equal to one of these extreme image values to provide a corresponding extreme appearance.

Claims 1-19 stand rejected under 35 U.S.C. 102(e) over Webber

Claims 1-5

Webber fails to teach an electrophoretic display panel that includes a driver that is configured to control, for each pixel, an estimate potential difference of a pair of electrodes as the inter-picture value that provides the pixels with a respective estimate picture appearance as the inter-picture appearance, as specifically claimed in claim 1, upon which claims 2-5 depend.

The Office action asserts that Webber provides this teaching at paragraph [0039], [0040], and [0052]. The applicants respectfully disagree with this assertion. Webber's paragraphs [0039] and [0040] address the physical structure and principles of operation of each pixel as illustrated in Webber's Figs. 1A and 1B, and [0052] addresses the increased stability provided by the addition of a polymer to the electrophoretic medium. The cited paragraphs do not address inter-picture appearances, and specifically do not address controlling an estimate potential difference of a pair of electrodes as the inter-picture value for each pixel.

The Board of Patent Appeals and Interferences has consistently upheld the principle that the burden of establishing a prima facie case resides with the Office, and to meet this burden, the Examiner must specifically identify where each of the claimed elements is found in the prior art:

"there must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention. Scripps Clinic & Research Found. v. Genentech, Inc., 927 F.2d 1565, 1576, 18 USPQ2d 1001, 1010 (Fed. Cir. 1991). To meet [the] burden of establishing a prima facie case of anticipation, the examiner must explain how the rejected claims are anticipated by pointing out where *all* of the specific limitations recited in the rejected claims are found in the prior art relied upon in the rejection." *Ex Parte Naoya Isoda*, Appeal No. 2005-2289, Application 10/064,508 (BPAI Opinion October 2005).

Webber teaches increasing the stability of the position of the suspended particles in an electrophoretic display panel by adding a polymer to the electrophoretic medium (Webber's Abstract). The Office action references Webber's "fig. 9, page 4, [0040], gray" for teaching providing the pixels with a respective estimate picture appearance as the inter-picture appearance (Office action, page 6, lines 4-6). Neither Webber's Fig. 9, nor paragraph [0040] addresses inter-picture pixel control. Webber's Fig. 9 merely illustrates the stability of the position of particles at white, gray, and black states over time:

"FIG. 9 is a graph showing the variation with time of white, black and gray states of the first preferred medium of the present invention" (Webber [0021]); and

"The L* ["Lightness"] values of all three states were monitored over time, and the results are shown in FIG. 9. From this Figure, it will be seen that the addition of the PIB was successful in stabilizing the intermediate gray state as well as the black and white states." (Webber [0090]).

Because Webber fails to teach a driver that is configured to control, for each pixel, an estimate potential difference of a pair of electrodes as the inter-picture value that provides the pixels with a respective estimate picture appearance as the inter-picture appearance, and because the Office action fails to identify where this teaching is found in Webber, the applicants respectfully maintain that the rejection of claims 1-5 under 35 U.S.C. 102(e) over Webber is unfounded and should be reversed by the Board.

Claims 2-5

Webber fails to teach the display panel of claim 1, wherein the respective estimate picture appearance is substantially equal to one of the extreme appearances associated with the subsequent picture appearance, as specifically claimed in claim 2, upon which claims 3-5 depend.

The Office action references Webber's "fig. 9, page 4, [0039]-[0040], white, gray, black" for teaching that the respective estimate picture appearance of the inter-picture is substantially equal to one of the extreme appearances associated with the subsequent picture appearance (Office action, page 6, lines 8-11). The applicants note, however, that the cited figure and paragraphs are silent with regard to an estimated picture appearance of an inter-picture, and silent with regard to setting such an appearance to an extreme appearance that is associated with a subsequent picture.

Because Webber fails to teach controlling each pixel to provide an estimate picture appearance that is substantially equal to one of the extreme appearances associated with a subsequent picture appearance, and because the Office action fails to identify where this teaching is found in Webber, the applicants respectfully maintain that the rejection of claims 2-5 under 35 U.S.C. 102(e) over Webber is unfounded and should be reversed by the Board.

Claims 6-19

Webber fails to teach determining inter-picture values based on at least second picture values, and fails to teach applying a sequence of potential differences across electrodes of pixels that includes potential differences corresponding to the inter-picture values, and potential differences corresponding to the second picture values, as specifically claimed in each of independent claims 6 and 13, upon which claims 7-12 and 14-19 depend.

The Office action asserts that Webber teaches determining inter-picture values based on at least second picture values at paragraph [0040]. The applicants respectfully disagree with this assertion. At the cited paragraph, Webber addresses the need to structure each pixel in a prismatic form with a wider base than height. Webber does not address determining inter-picture values based on at least second picture values, and specifically does not address this claimed element at paragraph [0040].

The Office action asserts that Webber teaches applying a sequence of potential differences across electrodes of pixels that includes potential differences corresponding to the inter-picture values at paragraphs [0039] and [0040]. The applicants respectfully disagree with this assertion. As noted above, Webber's paragraphs [0039] and [0040] address the physical structure and principles of operation of each pixel as illustrated in Webber's Figs. 1A and 1B. The cited paragraphs do not address applying a sequence of potential differences across electrodes of pixels that includes potential differences corresponding to the inter-picture values.

Because Webber fails to teach determining inter-picture values based on at least second picture values, and fails to teach applying a sequence of potential differences across electrodes of pixels that includes potential differences corresponding to the inter-picture values, and because the Office action fails to identify where this teaching is found in Webber, the applicants respectfully maintain that the rejection of claims 6-19 under 35 U.S.C. 102(e) over Webber is unfounded and should be reversed by the Board.

CONCLUSIONS

Because the Office action fails to identify where each element of each of the applicants' independent claims are found in Webber, the applicants respectfully request that the Examiner's rejection of claims 1-19 under 35 U.S.C. 102(e) over Webber be reversed by the Board, and the claims be allowed to pass to issue.

Because Webber fails to teach a driver that is configured to control, for each pixel, an estimate potential difference of a pair of electrodes as the inter-picture value that provides the pixels with a respective estimate picture appearance as the inter-picture appearance, the applicants respectfully request that the Examiner's rejection of claims 1-5 under 35 U.S.C. 102(e) over Webber be reversed by the Board, and the claims be allowed to pass to issue.

Because Webber fails to teach controlling each pixel to provide an estimate picture appearance that is substantially equal to one of the extreme appearances associated with a subsequent picture appearance, the applicants respectfully request that the Examiner's rejection of claims 2-5 under 35 U.S.C. 102(e) over Webber be reversed by the Board, and the claims be allowed to pass to issue.

Because Webber fails to teach determining inter-picture values based on at least second picture values, and fails to teach applying a sequence of potential differences across electrodes of pixels that includes potential differences corresponding to the inter-picture values, the applicants respectfully request that the Examiner's rejection of claims 6-19 under 35 U.S.C. 102(e) over Webber be reversed by the Board, and the claims be allowed to pass to issue.

Respectfully submitted

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CLAIMS APPENDIX

1. An electrophoretic display panel for displaying a picture and a subsequent picture comprising:

- a first and a second opposed substrate;
 - an electrophoretic medium between the substrates;
 - a plurality of pixels;
 - a first and a second electrode associated with each pixel for receiving a potential difference; and
 - a driver;
- the electrophoretic medium being able to provide each pixel with an appearance, being one of a first and a second extreme appearance and intermediate appearances between the first and the second extreme appearance, and
- the driver being able to control for each pixel the potential difference
- to a picture value that provides the pixel with a respective picture appearance being one of the appearances in dependence of the picture to be displayed, subsequently
 - to an inter-picture value that provides the pixel with a respective inter-picture appearance, and subsequently
 - to a subsequent picture value that provides the pixel with a respective subsequent picture appearance being one of the appearances in dependence of the subsequent picture to be displayed, wherein
- the driver is able to control for each pixel an estimate potential difference as the inter-picture value that provides the pixels with a respective estimate picture appearance as the inter-picture appearance.

2. The display panel of claim 1, wherein the respective estimate picture appearance is substantially equal to one of the extreme appearances associated with the subsequent picture appearance.

3. The display panel of claim 2, wherein the estimate picture appearance of each pixel is substantially equal to:

the first extreme appearance if the respective subsequent picture appearance is optically closer to the first extreme appearance than to the second extreme appearance, and

the second extreme appearance otherwise.

4. The display panel of claim 3, wherein the driver is further able to control for each pixel the potential difference for displaying the subsequent picture to have a sequence of preset values, the preset values in the sequence alternating in sign and having an absolute value in the order of the subsequent picture value, and to apply each preset value in the sequence for a duration being at least a factor of two smaller than a largest duration of the durations during which the subsequent picture values will be applied, before having the subsequent picture value.

5. The display panel of claim 4, wherein the sequence of preset values has a last preset value with equal sign as a sign of the subsequent picture value.

6. A method of driving an electrophoretic display panel, comprising:

receiving first picture values of a first picture and second picture values of a subsequent picture,

determining inter-picture values based on at least the second picture values,
and

applying a sequence of potential differences across electrodes of pixels of the electrophoretic display, the sequence including:

potential differences corresponding to the first picture values,
potential differences corresponding to the inter-picture values, and
potential differences corresponding to the second picture values.

7. The method of claim 6, wherein the inter-picture values are each substantially equal to one of a set of extreme image values.
8. The method of claim 7, wherein the set of extreme image values includes black and white.
9. The method of claim 7, wherein determining each inter-picture value includes selecting the extreme image value that is closest in value to a corresponding second picture value.
10. The method of claim 6, including applying a sequence of preset values of alternating signs.
11. The method of claim 10, wherein a duration of each preset value is at least a factor of two smaller than a largest duration during which the second picture values will be applied.
12. The method of claim 10, wherein the sign of each last applied preset value is equal to a sign of the corresponding second picture value.
13. A display device, comprising:
 - a controller that is configured to:
 - receive first picture values of a first picture and second picture values of a subsequent picture, and
 - determine inter-picture values based on at least the second picture values, and
 - a driver that is configured to apply a sequence of potential differences across electrodes of pixels of an electrophoretic display, the sequence including:
 - potential differences corresponding to the first picture values,
 - potential differences corresponding to the inter-picture values, and

potential differences corresponding to the second picture values.

14. The display device of claim 13, wherein the inter-picture values are each substantially equal to one of a set of extreme image values.

15. The display device of claim 14, wherein the set of extreme image values includes black and white.

16. The display device of claim 14, wherein the controller is configured to select the extreme image value that is closest in value to a second picture value corresponding to each inter-picture value.

17. The display device of claim 13, wherein the driver is configured to apply a sequence of preset values of alternating sign.

18. The display device of claim 17, wherein a duration of each preset value is at least a factor of two small than a largest duration during which the second picture values will be applied.

19. The display device of claim 17, wherein the sign of each last applied preset value is equal to a sign of the corresponding second picture value.

EVIDENCE APPENDIX

No evidence has been submitted that is relied upon by the appellant in this appeal.

RELATED PROCEEDINGS APPENDIX

Appellant is not aware of any co-pending appeal or interference which will directly affect or be directly affected by or have any bearing on the Board's decision in the pending appeal.